

**Final  
Site-Specific Field Sampling Plan,  
Site-Specific Safety and Health Plan, and Site-Specific  
Unexploded Ordnance Safety Plan Attachments  
Impact Area, Parcel 136Q-X**

**Fort McClellan  
Calhoun County, Alabama**

**Task Order CK10  
Contract No. DACA21-96-D-0018  
IT Project No. 796887**

**March 2002**

**Revision 0**

**Final  
Site-Specific Field Sampling Plan Attachment  
Site Investigation at Impact Area, Parcel 136Q-X**

**Fort McClellan  
Calhoun County, Alabama**

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**March 2002**

**Revision 0**

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## ***List of Acronyms***

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See Attachment 1, List of Abbreviations and Acronyms.

## ***Executive Summary***

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In accordance with Contract Number DACA21-96-D-0018, Task Order CK10, IT Corporation (IT) will conduct site investigation activities at Impact Area, Parcel 136Q-X, at Fort McClellan, Calhoun County, Alabama, to determine the presence or absence of potential site-specific chemicals (PSSC) at this site. The purpose of this site-specific field sampling plan (SFSP) is to provide technical guidance for sampling activities at Impact Area, Parcel 136Q-X.

Impact Area, Parcel 136Q-X is located in the northeastern portion of the Main Post of Fort McClellan. It was identified in the Environmental Photographic Interpretation Center (EPIC) report from the 1961 aerial photograph composite; however, it was not reported in the Archive Search Report (ASR).

IT personnel observed items reported to be 81mm mortars and 81mm mortar fin assemblies and stabilizer tubes during site walks conducted in December 2001. Also observed during the site walk were numerous shallow depressions/impact craters extending beyond the parcel boundary, and rock-filled 55-gallon drums with holes caused by fragments of ordnance (possibly produced by 81mm mortar firing).

IT will collect 8 surface soil samples, 8 subsurface soil samples, and 2 depositional soil samples. Potential contaminant sources at Impact Area, Parcel 136Q-X, are primarily unknown but may include explosives and metals. Chemical analyses of the samples collected during the field program will include nitroaromatic/nitramine explosives and metals. Ten percent of the sample types will also be analyzed for semivolatile and volatile organic compounds, chlorinated and organophosphorous pesticides, and chlorinated herbicides. Results from these analyses will be compared with site-specific screening levels, ecological screening values, and background values to determine if potential site-specific chemicals are present at the site at concentrations that pose an unacceptable risk to human health or the environment.

The presence of unexploded ordnance (UXO) is possible at the Impact Area, Parcel 136Q-X. The site falls within the "Possible Explosive Ordnance Impact Areas" shown on Plate 10 of the ASR. Therefore, UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at Impact Area, Parcel 136Q-X. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purpose of UXO avoidance.

This SFSP attachment to the installation-wide sampling and analysis plan (SAP) for Fort McClellan, will be used in conjunction with the site-specific safety and health plan, the site specific UXO safety plan, the installation-wide work plan, and the SAP. The SAP includes the installation-wide safety and health plan, monitoring well installation and maintenance plan, waste management plan, ordnance and explosives management plan, and quality assurance plan. Site-specific hazard analyses are included in the site-specific safety and health plan.



# **1.0 Project Description**

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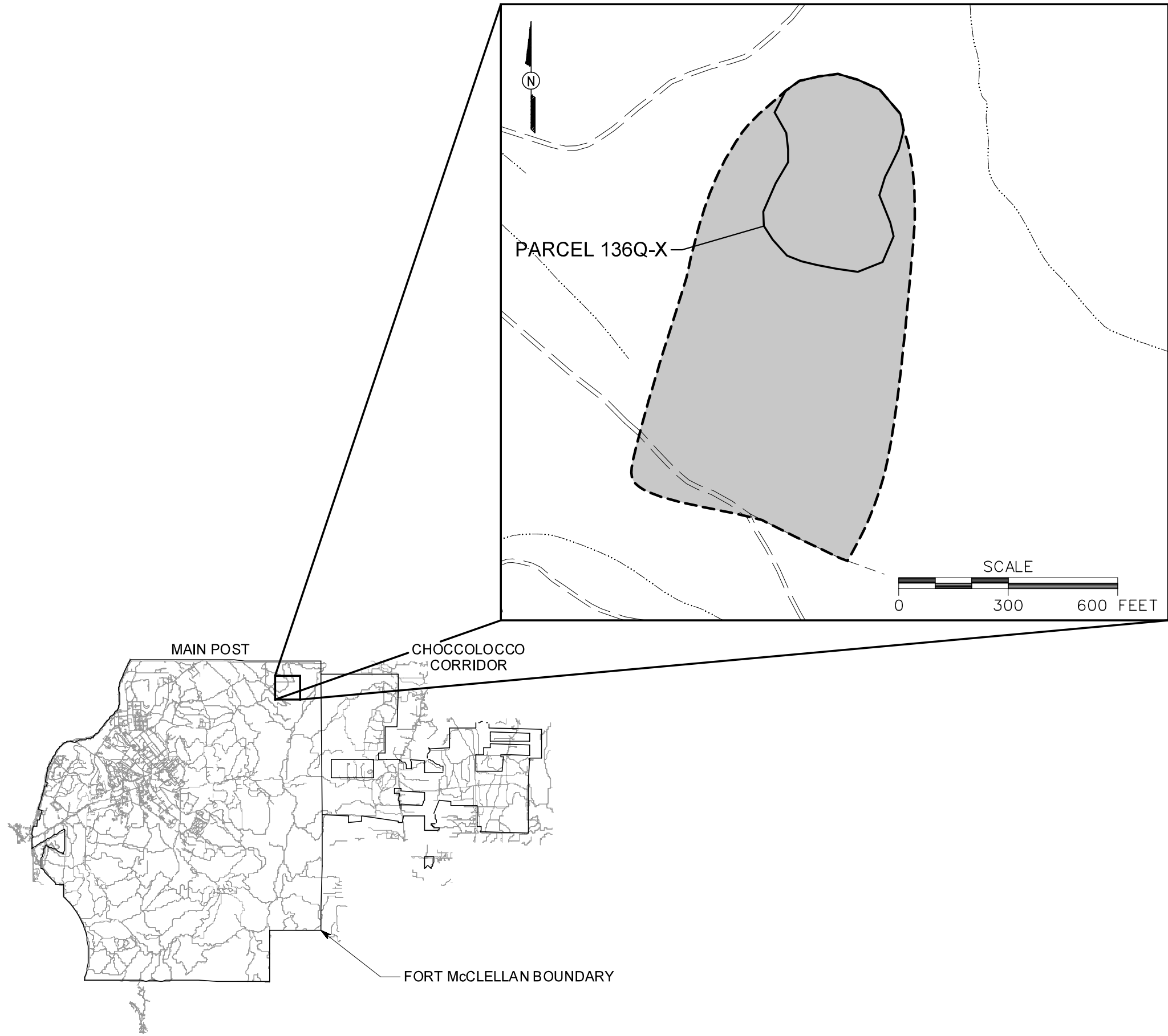
## **1.1 Introduction**

The U.S. Army is conducting studies of the environmental impact of suspected contaminants at Fort McClellan (FTMC) in Calhoun County, Alabama, under the management of the U.S. Army Corps of Engineers (USACE)-Mobile District. The USACE has contracted IT Corporation (IT) to provide environmental services for the site investigation (SI) of Impact Area, Parcel 136Q-X, under Task Order CK10, Contract Number DACA21-96-D-0018.

This site-specific field sampling plan (SFSP) attachment to the installation-wide sampling and analysis plan (SAP) (IT, 2002a) for FTMC has been prepared to provide technical guidance for sample collection and analysis at Impact Area, Parcel 136Q-X. This SFSP will be used in conjunction with the site-specific safety and health plan (SSHP); the site-specific unexploded ordnance (UXO) safety plan developed for Impact Area, Parcel 136Q-X; the installation-wide work plan (WP) (IT, 2002b), and SAP. The SAP includes the installation-wide safety and health plan (SHP), monitoring well installation and maintenance plan, waste management plan, ordnance and explosives management plan, and quality assurance plan (QAP). Site-specific hazard analyses are included in the SSHP.

## **1.2 Site Description**

Impact Area, Parcel 136Q-X, consists of approximately 4 acres located in the northeastern portion of the Main Post of FTMC (Figures 1-1 and 1-2) (Environmental Science and Engineering [ESE], 1998). The area of investigation was expanded to include a possible training area south of the parcel and consists of approximately 16 acres. Impact Area, Parcel 136Q-X, was identified in the Environmental Photographic Interpretation Center (EPIC) report from the 1961 aerial photograph composite (U.S. Environmental Protection Agency [EPA], 1990). The impact area was not visible on any other photograph presented in the EPIC report (ESE, 1998). In available FTMC aerial photographs reviewed by IT from 1937, 1940, 1954, 1969, 1976, 1982, and 1994, the parcel appears to be an unaltered, heavily wooded area. In the 1961 EPIC aerial photograph, Parcel 136Q-X appears to contain two small cleared areas, one at the northern boundary and the other at the southern boundary of the parcel (Figure 1-3). Though the Impact Area, Parcel 136Q-X, was identified by EPIC, it was not reported in the Archives Search Report (USACE, 1999a).

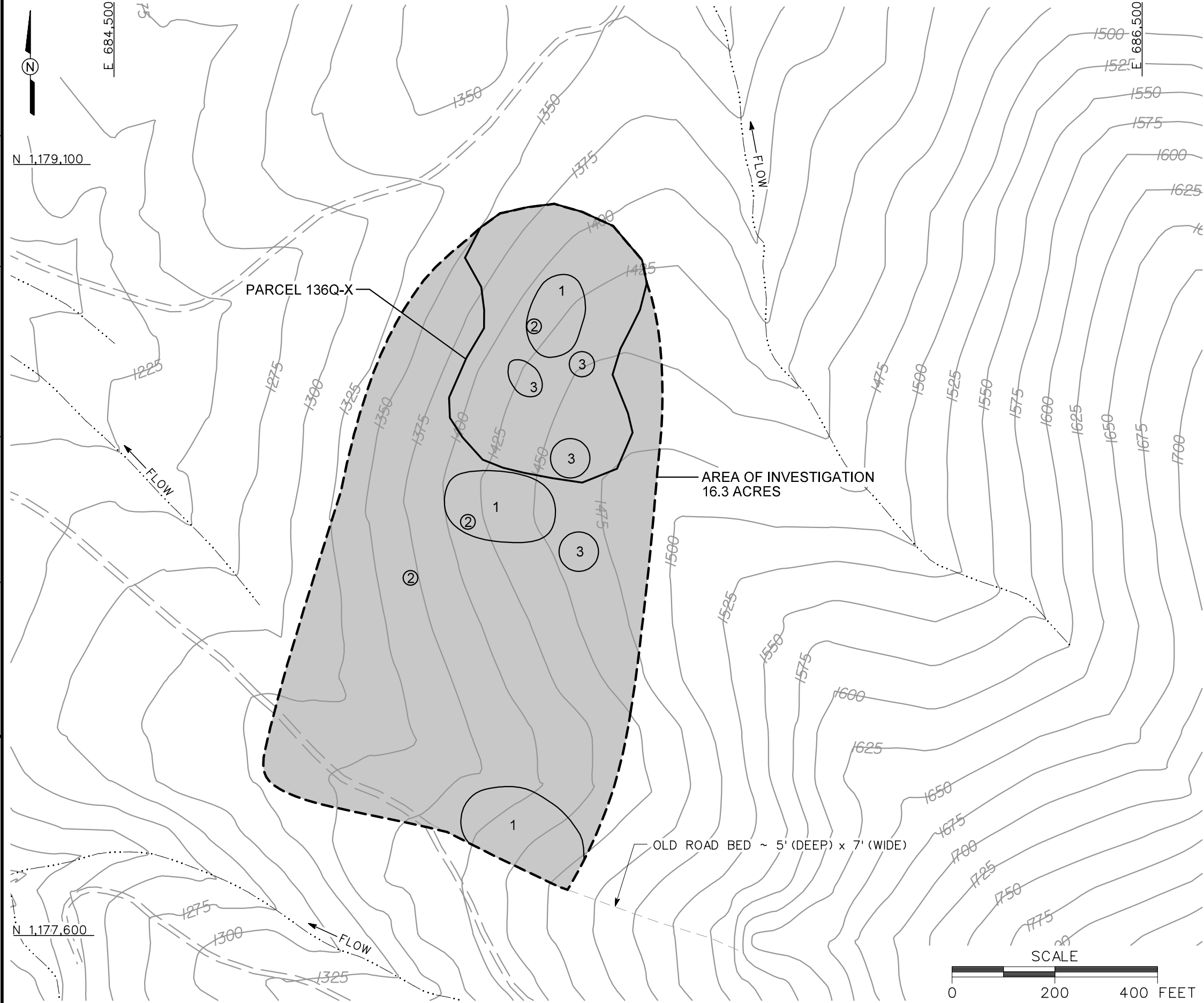


LEGEND

- UNIMPROVED ROADS AND PARKING
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK

FIGURE 1-1  
SITE LOCATION MAP  
IMPACT AREA  
PARCEL 136Q-X

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018



**LEGEND**

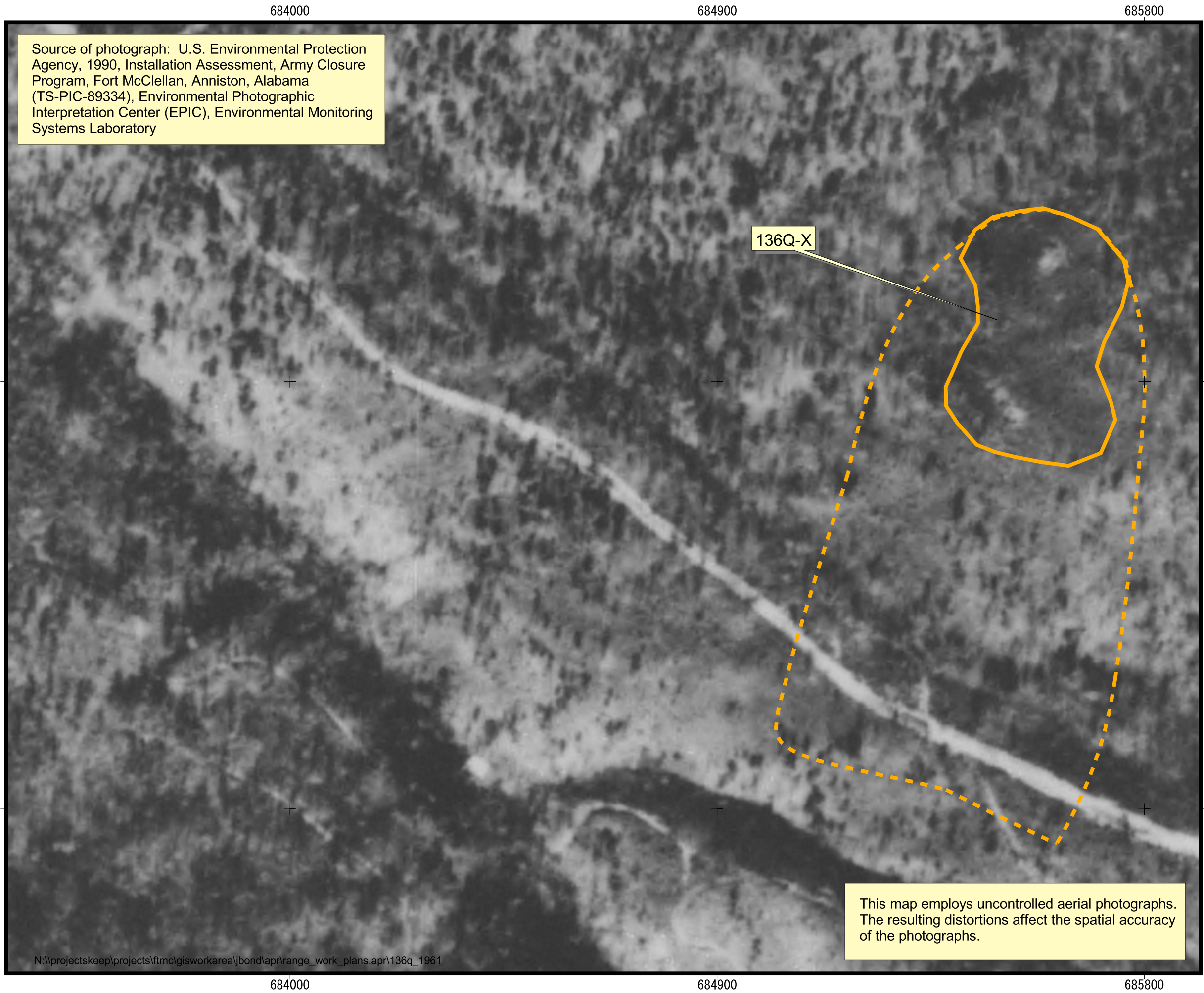
- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- UTILITY POLE

- TRAINING AIDS/PHYSICAL FEATURES OBSERVED**
- ① ROCK-FILLED 55-GALLON DRUMS WITH HOLES
  - ② 81mm MORTAR
  - ③ MORTAR FRAGMENTS, FINS

**FIGURE 1-2  
SITE MAP  
IMPACT AREA  
PARCEL 136Q-X**

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018

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# Figure 1-3

## 1961 EPIC Aerial Photograph

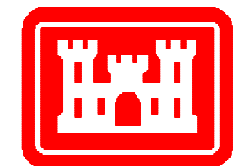
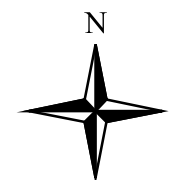
Impact Area,  
Parcel 136Q-X  
Fort McClellan, AL

### Legend

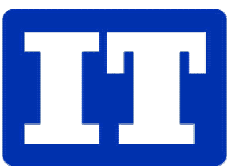
- Area of Investigation
- Parcel Boundary

0 200 Feet

NAD83 State Plane Coordinates



U.S. Army Corps  
of Engineers  
Mobile District



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Contract No. DACA21-96-D-0018

Direction of fire into the impact area was likely from the north-northeast or northwest. The Environmental Baseline Survey (EBS) identifies an 81mm mortar range and a former mortar firing point north of this area (ESE, 1998). According to the EBS, Impact Area, Parcel 136Q-X, is located approximately 950 meters southwest of the 81 mm mortar firing line (ESE, 1998). IT personnel observed items reported to be 81mm mortars and 81mm mortar fin assemblies and stabilizer tubes during site walks conducted in December 2001. These items are located within and outside of the parcel boundary defined by the EBS (Figure 1-2). Also, observed during the site walk were numerous shallow depressions/impact craters, extending beyond the parcel boundary, and rock-filled 55-gallon drums with bullet or other ammunition holes caused by fragments of ordnance (possibly produced by 81mm mortar firing).

Soils at Impact Area, Parcel 136Q-X, are characterized as stony rough land sandstone (Ss) (U.S. Department of Agriculture [USDA], 1961). This soil type consists of rough, mountainous areas with outcrops of sandstone and quartzite bedrock, loose rock fragments, and scattered patches of sandy soil material. It also includes rock escarpments on higher parts of the Choccolocco and Coldwater Mountains where quartzite of the Weisner formation is common (USDA, 1961).

The stony rough land sandstone consists of well-drained, shallow or stony, friable, medium to strongly acidic soils. Slopes generally are more than 25 percent. Erosion has been slight to severe, and some of the slopes have lost all of their original surface soil. The soil material is generally shallow over bedrock. Runoff is high, permeability is moderate to rapid, infiltration is slow, and the capacity for available moisture is low. The depth to bedrock is typically less than 2.5 feet, with depth to water exceeding 20 feet below ground surface (bgs) (USDA, 1961).

### **1.3 Scope of Work**

The scope of work for activities associated with the SI at Impact Area, Parcel 136Q-X, as specified by the statement of work (USACE, 1999b), includes the following tasks:

- Develop the SFSP attachment.
- Develop the SSHP attachment.
- Conduct a surface and near-surface UXO survey over all areas to be included in the sampling effort.

- Provide downhole UXO support for all intrusive drilling to determine buried downhole hazards.
- Collect 8 surface soil samples, 8 subsurface soil samples, and 2 depositional soil sample, to determine whether potential site-specific chemicals (PSSC) are present at Impact Area, Parcel 136Q-X, and to provide data useful for supporting any future planned corrective measures and closure activities.
- Analyze samples for the parameters listed in Section 4.5.

UXO surface sweeps and downhole surveys of soil borings will be required to support field activities at this site. The surface sweeps and downhole surveys will be conducted to identify anomalies for the purposes of UXO avoidance. The site-specific UXO safety plan will be used to support sample collection activities at Impact Area, Parcel 136Q-X, should incidental ordnance, explosives, and UXO be encountered and require avoidance.

At completion of the field activities and sample analyses, draft and final SI summary reports will be prepared to summarize the results of the activities, to evaluate the absence or presence of PSSCs at this site, and to recommend further actions, if appropriate. SI sampling reports will be prepared in accordance with current U.S. Environmental Protection Agency (EPA), Region IV, and the Alabama Department of Environmental Management (ADEM) guidelines.

## **2.0 Summary of Existing Environmental Studies**

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The EBS was conducted by ESE to document current environmental conditions of all FTMC property (ESE, 1998). The study was to identify sites that, based on available information, have no history of contamination and comply with U.S. Department of Defense guidance for fast-track cleanup at closing installations. The EBS also provides a baseline picture of FTMC properties by identifying and categorizing the properties by the following seven criteria:

1. Areas where no storage, release, or disposal of hazardous substance or petroleum products has occurred (including no migration of these substances from adjacent areas)
2. Areas where only release or disposal of petroleum products has occurred
3. Areas where release, disposal, and/or migration of hazardous substance has occurred, but at concentrations that do not require a removal or remedial response
4. Areas where release, disposal, and/or migration of hazardous substance has occurred, and all removal or remedial actions to protect human health and the environment have been taken
5. Areas where release, disposal, and/or migration of hazardous substance has occurred, and removal or remedial actions are underway, but all required remedial actions have not yet been taken
6. Areas where release, disposal, and/or migration of hazardous substance has occurred, but required actions have not yet been implemented
7. Areas that are not evaluated or require further evaluation.

For non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) environmental or safety issues, the parcel label includes the following components: a unique non-CERCLA issue number, the letter "Q" designating the parcel as a Community Environmental Response Facilitation Act (CERFA) Category 1 Qualified Parcel, and the code for the specific non-CERCLA issue(s) present (ESE, 1998). The non-CERCLA issue codes used are:

- A = Asbestos (in buildings)
- L = Lead-based paint (in buildings)
- P = Polychlorinated biphenyls
- R = Radon (in buildings)



- RD = Radionuclides/radiological issues
- X = UXO
- CWM = Chemical warfare material.

The EBS was conducted in accordance with the CERFA (CERFA-Public Law 102-426) protocols and U.S. Department of Defense policy regarding contamination assessment. Record searches and reviews were performed on all reasonably available documents from FTMC, ADEM, EPA Region IV, and Calhoun County, as well as a database search of CERCLA-regulated substances, petroleum products, and Resource Conservation and Recovery Act-regulated facilities. Available historical maps and aerial photographs were reviewed to document historical land uses. Personal and telephone interviews of past and present FTMC employees and military personnel were conducted. In addition, visual site inspections were conducted to verify conditions of specific property parcels.

Impact Area, Parcel 136Q-X, was issued the letter “Q”, designating the parcel as a Category 1 CERFA site. Category 1 sites are areas where no known or recorded storage, release, or disposal (including migration) has occurred on site property. Impact Area, Parcel 136Q-X was also assigned the UXO qualifier “X” for potential unexploded ordnance. The Impact Area, Parcel 136Q-X requires additional evaluation to determine its environmental condition.



## **3.0 Site-Specific Data Quality Objectives**

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### **3.1 Overview**

The data quality objective (DQO) process is followed to establish data requirements. This process ensures that the proper quantity and quality of data are generated to support the decision-making process associated with the action selection for Impact Area, Parcel 136Q-X. This section incorporates the components of the DQO process described in the publication EPA 6001R-961005 Guidance for the Data Quality Objectives Process (EPA, 2000). The DQO process as applied to Impact Area, Parcel 136Q-X, is described in more detail in Section 3.4 of this SFSP. Table 3-1 provides a summary of the factors used to determine the appropriate quantity of samples and the procedures necessary to meet the objectives of the SI and establish a basis for future action at this site.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Chapter 4.0 in this SFSP and Section 5.0 of the QAP. Data will be reported in accordance with definitive data requirements of Chapter 2, *Chemistry Data Reporting Requirements and Data Package Deliverables*, USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic And Radioactive Waste (HTRW) Projects* (USACE, 1997) and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported via hard-copy data packages by the laboratory, using Contract Laboratory Program-like forms along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

### **3.2 Data Users and Available Data**

The available data related to the SI at Impact Area, Parcel 136Q-X, presented in Table 3-1, have been used to formulate a site-specific conceptual model. This conceptual model was developed to support the development of this SFSP, which is necessary to meet the objectives of these activities and to establish a basis for future action at the site. The users of the data and information generated during field activities are primarily EPA, USACE, ADEM, FTMC, and the USACE supporting contractors. This SFSP, along with the necessary companion documents, has been designed to provide the regulatory agencies with sufficient detail to reach a determination as to the adequacy of the scope of work. The program has also been designed to

Table 3-1

**Summary of Data Quality Objectives  
Impact Area, Parcel 136Q-X  
Site Investigation  
Fort McClellan, Calhoun County, Alabama**

Users	Available Data	Conceptual Site Model	Media of Concern	Data Uses and Objectives	Data Types	Analytical Level	Data Quantity
EPA, ADEM USACE, DOD FTMC, IT Corporation, other contractors, and possible future land users	None	<u>Contaminant Source</u> Impact Area, Parcel 136Q-X (explosives and metals)	<u>Surface soil</u>	SI to confirm the presence or absence of contamination in the site media	<u>Surface soil</u> TAL Metals, Nitroaromatic/Nitramine Explosives; Plus 10% of sample types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	8 direct-push surface soil samples + QC
		<u>Migration Pathways</u> Infiltration and leaching to subsurface soil, biotransfer to venison, dust emissions and volatilization to ambient air, and runoff to depositional soil	<u>Subsurface soil</u>		<u>Subsurface Soil</u> TAL Metals, Nitroaromatic/Nitramine Explosives; Plus 10% of sample types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	8 direct-push subsurface soil samples + QC
		<u>Potential Receptors</u> Recreational site user (current and future) Resident (future)	<u>Depositional soil</u>	Definitive quality data for future decision- making	<u>Depositional soil</u> TAL Metals, Nitroaromatic/Nitramine Explosives; Plus 10% of sample types for TCL VOCs, TCL SVOCs, CI Pesticides, OP Pesticides, and CI Herbicides	Definitive data in data packages (as defined in USACE EM200-1-6)	2 depositional soil sample + QC
		<u>PSSC</u> metals, nitroaromatic/nitramine explosives, SVOCs, VOCs, CI Pesticides, OP Pesticides, and CI Herbicides					

ADEM - Alabama Department of Environmental Management.

CI - Chlorinated.

DOD - U.S. Department of Defense.

EM200-1-6 - USACE Engineering Manual, *Chemical Quality Assurance for HTRW Projects*, October 10, 1997.

EPA - U.S. Environmental Protection Agency.

FTMC - Fort McClellan.

OP - Organophosphorus.

PSSC - Potential site-specific chemical.

QC - Quality control.

SI - Site investigation.

SVOCs - Semivolatile organic compounds.

TAL - Target analyte list.

TCL - Target compound list.

TOC - Total organic carbon.

USACE - U.S. Army Corps of Engineers.

VOCs - Volatile organic compounds.

provide the level of defensible data and information required to confirm or rule out the existence of residual chemical contamination in site media.

### ***3.3 Conceptual Site Exposure Model***

The conceptual site exposure model (CSEM) provides the basis for identifying and evaluating potential risks and hazards to human health in the risk assessment. The CSEM includes receptors and potential exposure pathways appropriate to all plausible scenarios. The CSEM facilitates a consistent and comprehensive evaluation of risk to human health through graphically presenting all possible exposure pathways, including sources, release and transport pathways, and exposure routes. In addition, the CSEM helps to ensure that potential pathways are not overlooked. The elements of a complete exposure pathway and CSEM are:

- Source (i.e., contaminated environmental) media
- Contaminant release mechanisms
- Contaminant transport pathways
- Receptors
- Exposure pathways.

Contaminant release mechanisms and transport pathways are not relevant for direct receptor contact scenarios with a contaminated source medium.

Primary contaminant releases were probably limited to training activities, more precisely pieces of ammunition deposited on or within surface and subsurface soil and their subsequent breakdown. Potential contaminant transport pathways include infiltration and leaching to subsurface soil, biotransfer to deer through browsing, dust emissions and volatilization to ambient air, and transfer to depositional soils via surface water runoff. Because the site is located on a rocky hill, it is unlikely that contaminant releases could leach to groundwater.

Currently the site is not utilized and is not maintained. Trees cover most of the study area. Although access to Fort McClellan is limited, it is possible that an individual could circumvent the perimeter fence on the base and trespass into the area to hunt. A drainage creek is located to the west (i.e., downgradient) of the site. The only plausible receptor under the current land-use scenario is a recreational site user who may hunt. Because the drainage creek is usually dry, surface water and sediment exposure pathways will not be quantified unless these media are encountered during sampling. The ingestion of fish is not quantified because the creek does not

provide sufficient aquatic habitat for fish of edible size. The following potential receptors were considered, but not included under the current land-use scenario:

- **Groundskeeper.** The ranges are not currently maintained or regularly used for any base activities.
- **Construction Worker.** The site is unused, and no development or construction is occurring or scheduled.
- **Resident.** The site is not currently used for residential purposes.

Future land-use in this area is shown as remediation reserve and passive recreation in the Fort McClellan Comprehensive Reuse Plan (FTMC, 1997). Plausible future land-use receptor scenarios addressed in the CSEM include:

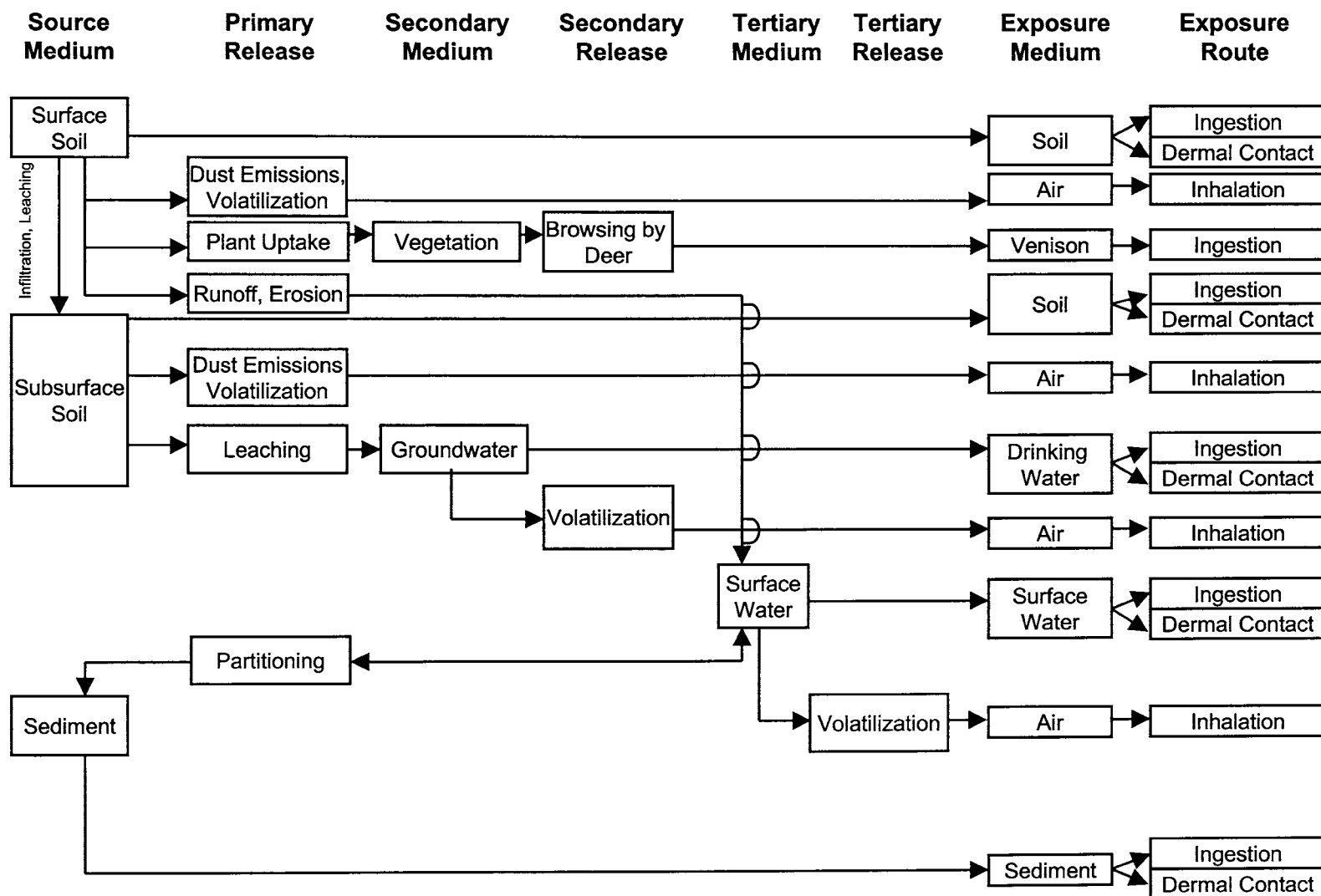
- **Groundskeeper.** The site will not have areas that require regular upkeep in the future.
- **Construction Worker.** Construction activities or maintenance of buried utilities are not planned for the future.
- **Recreational Site User.** Because the future site is planned for passive recreational use, and hunting is a viable option, the recreational site user is included. Fish ingestion will not be evaluated because the creek is too small to support fish for consumption.
- **Resident.** Although the site is not planned for residential use, the residential scenario is considered in order to provide information for the project manager and regulators.

A summary of relevant contaminant release and transport mechanisms, source and exposure media, and receptors and exposure pathways for this site is provided in Table 3-1 and Figure 3-1.

### **3.4 Decision-Making Process, Data Uses, and Needs**

The seven-step decision-making process is presented in detail in Section 3.0 of the QAP and will be followed during the SI at Impact Area, Parcel 136Q-X. Data uses and needs are summarized in Table 3-1.

**Figure 3-1**  
**Human Health Conceptual Site Exposure Model**  
**Impact Area, Parcel 136Q-X**  
**Fort McClellan, Calhoun County, Alabama**



Receptor Scenarios		
Resident - Future	Recreational Site User - Current	Recreational Site User - Future
*	*	*
*	*	*
2	2	2
*	*	*
1	1	1
1	1	1
1	1	1
3	1	1
3	1	1
3	1	1
4	4	4
4	4	4
2	2	2
4	4	4
4	4	4

- \* = Complete exposure pathway evaluated in the streamlined risk assessment.  
 1 = Incomplete exposure pathway.  
 2 = Although theoretically complete, this pathway is judged to be insignificant and is not evaluated in the streamlined risk assessment.  
 3 = Because the site is located on a rocky hill, transport to groundwater is unlikely and is not quantified.  
 4 = Creek is expected to be dry. Surface water and sediment pathways will be quantified for this receptor if water is present in the creek.

### **3.4.1 Risk Evaluation**

Confirmation of contamination at Impact Area, Parcel 136Q-X, will be based on using EPA site definitive data to determine whether or not PSSCs are detected in site media. Detected chemical concentrations at the site will be compared to site-specific screening levels, ecological screening values, and background values to determine if PSSCs are present at the site at concentrations that pose an unacceptable risk to human health or the environment. Definitive data will be adequate for confirming the presence of site contamination and for supporting a feasibility study and risk assessment.

Assessment of the potential ecological risk associated sites or parcels (e.g., specific ecological assessment methods, etc.) will be addressed in accordance with procedures in Section 5.3 of the WP (IT, 2002b).

### **3.4.2 Data Types and Quality**

Surface soil, subsurface soil, and depositional soil will be sampled and analyzed to meet the objectives of the SI at Impact Area, Parcel 136Q-X. Quality assurance/quality control (QA/QC) samples will be collected for all sample types as described in Chapter 4.0 of this SFSP. Samples will be analyzed by EPA-approved SW-846 methods, including Update III, where applicable. Samples will comply with EPA definitive data requirements; also, samples will be reported using hard-copy data packages. In addition to meeting the quality needs of this SI, data analyzed at this level of quality are appropriate for all phases of site characterization, remedial investigation, and risk assessment.

### **3.4.3 Precision, Accuracy, and Completeness**

Laboratory requirements of precision, accuracy, and completeness for this SI are defined in Section 3.3 and presented in Section 5.0 of the QAP (IT, 2002a).

## **4.0 Field Activities**

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### **4.1 UXO Survey Requirements and Utility Clearances**

Impact Area, Parcel 136Q-X, falls within the "Possible Explosive Ordnance Impact Areas" shown on Plate 10 of the *Archives Search Report, Maps, Fort McClellan, Anniston, Alabama* (USACE, 1999a). Therefore, IT will conduct UXO avoidance activities, including surface sweeps and downhole surveys of soil borings. The site-specific UXO safety plan provides technical guidance for ordnance and explosives avoidance for sample collection activities at Impact Area, Parcel 136Q-X. The site-specific UXO safety plan attachment has been written in conjunction with Appendix E of the SAP (IT, 2002a).

#### **4.1.1 Surface UXO Survey**

A UXO sweep will be conducted over areas that will be included in the sampling and surveying activities to identify UXO on or near the surface that may present a hazard to on-site workers during field activities. Low-sensitivity magnetometers will be used to locate surface and shallow-buried metal objects. UXO located on the surface will be identified and conspicuously marked for easy avoidance. Subsurface metallic anomalies will not be disturbed, but will also be marked for easy avoidance. UXO personnel requirements, procedures, and detailed descriptions of the geophysical equipment to be used are provided in Appendix E of the SAP (IT, 2002a).

#### **4.1.2 Downhole UXO Survey**

During the soil boring and downhole sampling activities, downhole UXO surveys will be performed to determine if buried metallic objects are present. UXO monitoring, as described in Appendix E of the SAP (IT, 2002a), will continue until undisturbed soils are encountered or the borehole has been advanced to 12 feet bgs, whichever is reached first.

#### **4.1.3 Utility Clearances**

After the UXO surface survey has cleared the area to be sampled and prior to performing any intrusive sampling, a utility clearance will be performed at locations where soil samples will be collected, using the procedure outlined in Section 4.2 of the SAP (IT, 2002a). The site manager will mark the proposed locations with stakes, coordinate with the local utility companies to clear the proposed locations for utilities, and obtain digging permits. Once the locations are approved (for both UXO and utility avoidance) for intrusive sampling, the stakes will be labeled as cleared.

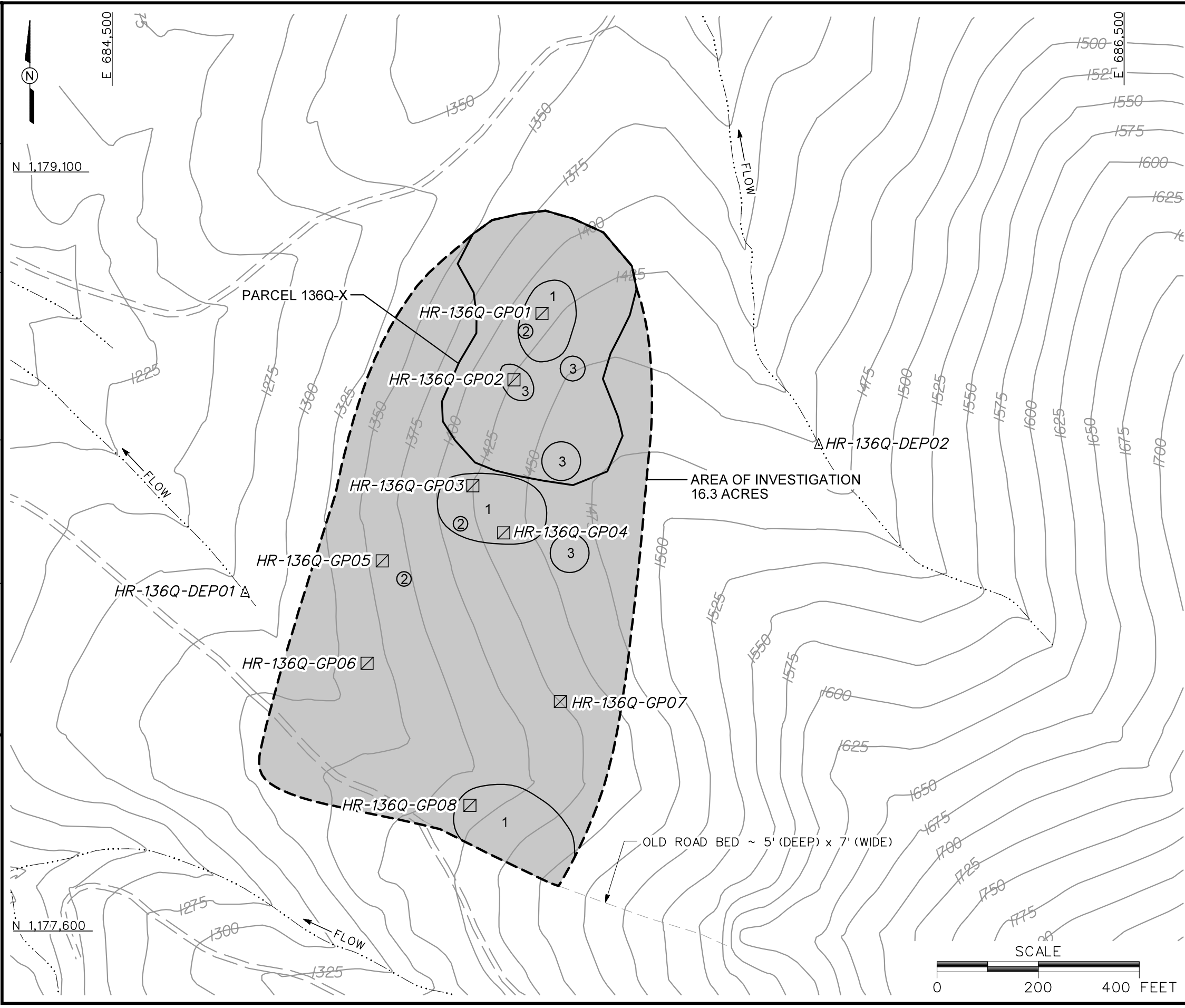
Table 4-1

**Sample Locations and Rationale**  
**Site Investigation, Impact Area, Parcel 136Q-X**  
**Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Media	Sample Location Rationale
HR-136Q-GP01	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located in Parcel 136Q-X within the northern area of 55-gallon drums with holes. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-GP02	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located in Parcel 136Q-X in the vicinity of mortar fin assemblies and fragments located during site walks. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-GP03	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located south-southwest of Parcel 136Q-X, within the central area of 55-gallon drums with holes. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-X-GP04	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located south of Parcel 136Q-X, near the center of the area of investigation, and in the central portion of an area of 55-gallon drums with holes. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-GP05	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located southwest of the EBS defined Parcel 136Q-X, in the west-central portion of the area of investigation and downslope of a reported 81mm mortar. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-GP06	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located in the southwestern portion of the area of investigation, near the western boundary. This boring will be located in the vicinity of surface depressions/impact craters observed in the area. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-GP07	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located in the southeastern portion of the area of investigation, near the eastern boundary. This boring will be located in the vicinity of surface depressions/impact craters observed in the area. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-GP08	Surface soil Subsurface soil	Soil boring for surface and subsurface soil samples to be located south of Parcel 136Q-X, in the southeastern most portion of the area of investigation within the southern area of 55-gallon drums with holes, on the downgradient side. Sample data will indicate if contaminant releases into the environment have occurred from the use of this area and if contaminated media exist at this site. Soil sample data will also be used to assess potential impacts to terrestrial biota that might utilize the site for food and/or habitat purposes.
HR-136Q-DEP01	Depositional soil	The sample will be placed in the intermittent streambed located west of the area of investigation. The sample will be collected from the intermittent streambed near its point of origin just west of the southwest portion of the area of investigation. Sample data will indicate if contaminant releases into the environment have occurred from use of this area and if contaminated media exists at this site. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may
HR-136Q-DEP02	Depositional soil	The sample will be placed in the intermittent stream that flows north/northwest. The intermittent stream is to the east of the area of investigation boundary. Sample data will indicate if contaminant releases into the environment have occurred from use of this area and if contaminated media exists at this site. Sample data will also be used to assess potential impacts to aquatic biota in the waterway and other ecological receptors that may utilize the waterway for food and/or habitat purposes.



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ENGR. CHECK, BY: S. MORAN  
INITIATOR: J. JENKINS  
PROJ. MGR.: J. YACOB  
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**LEGEND**

- UNIMPROVED ROADS AND PARKING
- PAVED ROADS AND PARKING
- BUILDING
- TOPOGRAPHIC CONTOURS (CONTOUR INTERVAL - 25 FOOT)
- TREES / TREELINE
- PARCEL BOUNDARY
- AREA OF INVESTIGATION
- SURFACE DRAINAGE / CREEK
- UTILITY POLE
- PROPOSED SURFACE AND SUBSURFACE SOIL SAMPLE LOCATION
- PROPOSED DEPOSITIONAL SOIL SAMPLE LOCATION

**TRAINING AIDS/PHYSICAL FEATURES OBSERVED**

- ① ROCK-FILLED 55-GALLON DRUMS WITH HOLES
- ② 81mm MORTAR
- ③ MORTAR FRAGMENTS, FINS

**FIGURE 4-1**  
**PROPOSED SAMPLE LOCATION MAP**  
**IMPACT AREA**  
**PARCEL 136Q-X**

U. S. ARMY CORPS OF ENGINEERS  
MOBILE DISTRICT  
FORT McCLELLAN  
CALHOUN COUNTY, ALABAMA  
Contract No. DACA21-96-D-0018



Table 4-2

**Surface and Subsurface Soil Sample Designations and Analytical Parameters**  
**Site Investigation,**  
**Impact Area, Parcel 136Q-X**  
**Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Depth (ft)	QA/QC Samples		Analytical Suite
			Field Duplicates	MS/MSD	
HR-136Q-GP01	HR-136Q-GP01-SS-QJ0001-REG	0-1		HR-136Q-GP01-SS-QJ0001-MS/MSD	TAL Metals and Explosives
	HR-136Q-GP01-DS-QJ0002-REG	2-4			
HR-136Q-GP02	HR-136Q-GP02-SS-QJ0003-REG	0-1			TCL VOCs, TCL SVOCs, TAL Metals, Explosives, CI and Op Pesticides, and CI Herbicides
	HR-136Q-GP02-DS-QJ0004-REG	2-4			
HR-136Q-GP03	HR-136Q-GP03-SS-QJ0005-REG	0-1			TAL Metals and Explosives
	HR-136Q-GP03-DS-QJ0006-REG	2-4			
HR-136Q-GP04	HR-136Q-GP04-SS-QJ0007-REG	0-1			TCL VOCs, TCL SVOCs, TAL Metals, Explosives, CI and Op Pesticides, and CI Herbicides
	HR-136Q-GP04-DS-QJ0008-REG	2-4	HR-136Q-GP04-DS-QJ0009-FD		
HR-136Q-GP05	HR-136Q-GP05-SS-QJ0010-REG	0-1			TAL Metals and Explosives
	HR-136Q-GP05-DS-QJ0011-REG	2-4			
HR-136Q-GP06	HR-136Q-GP06-SS-QJ0012-REG	0-1			TAL Metals and Explosives
	HR-136Q-GP06-DS-QJ0013-REG	2-4			
HR-136Q-GP07	HR-136Q-GP07-SS-QJ0014-REG	0-1			TAL Metals and Explosives
	HR-136Q-GP07-DS-QJ0015-REG	2-4			
HR-136Q-GP08	HR-136Q-GP08-SS-QJ0016-REG	0-1			TAL Metals and Explosives
	HR-136Q-GP08-DS-QJ0017-REG	2-4			

CI and Op - Chlorinated and Organophosphorous  
Explosives - Nitroaromatic and Nitramine.  
FD - Field duplicate.  
MS/MSD - Matrix spike/matrix spike duplicate.  
QA/QC - Quality assurance/quality control.

REG - Field sample.  
SVOCs - Semivolatile organic compounds.  
TAL - Target analyte list.  
TCL - Target compound list.  
VOCs - Volatile organic compounds.

## **4.2 Environmental Sampling**

The environmental sampling program at Impact Area, Parcel 136Q-X, includes the collection of surface soil, subsurface soil, and depositional soil samples for chemical analyses. These samples will be collected and analyzed to provide data for characterizing the site to determine the environmental condition and any further action to be conducted at the site. Additionally, samples will be collected from environmental media in locations that will assist in the assessment of potential ecological impacts resulting from activities at the site.

### **4.2.1 Surface Soil Sampling**

Surface soil samples will be collected from 8 locations at Impact Area, Parcel 136Q-X.

#### **4.2.1.1 Sample Locations and Rationale**

The sampling rationale for each surface soil sampling location is listed in Table 4-1. Proposed sampling locations are shown in Figure 4-1. Surface soil sample designations and QA/QC sample requirements are summarized in Table 4-2. The final soil sampling locations will be determined in the field by the on-site geologist, based on actual field conditions.

#### **4.2.1.2 Sample Collection**

Surface soil samples will be collected from the upper 1 foot of soil by direct-push methodology as specified in Section 5.1.1.1 and Section 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a stainless steel hand auger as specified in Section 5.1.1.2 and Section 6.1.1.1 of the SAP (IT, 2002a). Collected soil samples will be screened using a photoionization detector (PID) in accordance with Section 6.8.3 of the SAP. Surface soil samples will be screened for information purposes only, and not to select samples for analysis. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Section 4.0 and listed in Table 4-1, of the QAP. Sample documentation and chain-of-custody (COC) will be recorded as specified in Section 6.0 of the SAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

### **4.2.2 Subsurface Soil Sampling**

Subsurface soil samples will be collected from 8 soil boring locations at Impact Area, Parcel 136Q-X.

#### **4.2.2.1 Sample Locations and Rationale**

Subsurface soil samples will be collected from the soil borings proposed on Figure 4-1. The subsurface soil sampling rationales are listed in Table 4-1. Subsurface soil sample designations and QA/QC sample requirements are listed in Table 4-2. The final soil boring sampling locations will be determined in the field by the on-site geologist, based on actual field observations and utility and UXO clearance results.

#### **4.2.2.2 Sample Collection**

Subsurface soil samples will be collected from soil borings at a depth greater than 1 foot bgs in the unsaturated zone. The soil borings will be advanced and soil samples collected using the direct-push sampling procedures specified in Section 5.1.1.1 and Section 6.1.1.1 of the SAP (IT, 2002a). In areas where site access does not permit the use of a direct-push rig, the samples will be collected using a hand-auger as specified in Section 5.1.1.2 and 6.1.1.1 of the SAP.

Soil samples will be collected continuously for the first four feet or until either groundwater or refusal is reached. The on-site geologist will record a detailed lithological log for each borehole. At least one subsurface sample from each borehole will be selected for analysis. The collected subsurface soil samples will be field-screened using a PID in accordance with Section 6.8.3 of the SAP to measure samples exhibiting elevated readings exceeding background (readings in ambient air). Typically, the subsurface soil sample showing the highest reading (above background) will be selected and sent to the laboratory for analysis. If none of the samples indicate readings exceeding background using the PID, the deepest interval from the soil boring will be sampled and submitted to the laboratory for analysis. Subsurface soil samples may be selected for analysis from any depth interval if the on-site geologist suspects PSSCs at the interval. Site conditions such as lithology may also determine the actual sample depth interval submitted for analysis. The depth of the boring may be extended beyond four feet bgs and more than one subsurface soil sample may be collected if field measurements and observations indicate a possible layer of PSSCs and/or additional sample data would provide insight to the existence of any PSSCs.

Sample documentation and COC will be recorded as specified in Section 6.0 of the SAP.

Sample containers, sample volumes, preservatives, and holding times for the analyses required in this SFSP are discussed in Section 4.0 and listed in Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

### **4.2.3 Depositional Sampling**

Two depositional soil samples will be collected from Impact Area, Parcel 136Q-X.

#### **4.2.3.1 Sample Locations and Rationale**

The proposed locations for the depositional samples are shown on Figure 4-1. Depositional sampling rationale is presented in Table 4-1. The depositional sample designations and required QA/QC sample requirements are listed in Table 4-3. The actual depositional sample points will be at the discretion of the ecological sampler, based on drainage pathways and actual field observations.

#### **4.2.3.2 Sample Collection**

The depositional soil samples will be collected in accordance with the procedures for surface soil samples specified in Section 6.1.1.1 of the SAP. Sample documentation and COC will be recorded as specified in Section 6.0 of the SAP. Sample containers, sample volumes, preservatives, and holding times for the analyses required in this are discussed in Section 4.0 and listed in Table 4-1 of the QAP. The samples will be analyzed for the parameters listed in Section 4.5 of this SFSP.

### **4.3 Decontamination Requirements**

Decontamination will be performed on sampling and nonsampling equipment to prevent cross-contamination between sampling locations. Decontamination of sampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.1 of the SAP (IT, 2002a). Decontamination of nonsampling equipment will be performed in accordance with the requirements presented in Section 6.5.1.2 of the SAP.

### **4.4 Surveying of Sample Locations**

Sampling locations will be marked with pin flags, stakes, and/or flagging and will be surveyed using either global positioning system (GPS) or conventional civil survey techniques, as necessary to obtain the required level of accuracy. Horizontal coordinates will be referenced to the U.S. State Plane Coordinate System, Alabama East Zone, North American Datum of 1983. Elevations will be referenced to the North American Vertical Datum of 1988.

Table 4-3

**Depositional Soil Sample Designation and Analytical Parameters**  
**Site Investigation, Impact Area, Parcel 136Q-X**  
**Fort McClellan, Calhoun County, Alabama**

Sample Location	Sample Designation	Sample Matrix	Sample Depth	QA/QC Samples		Analytical Suite
				Field Duplicates	MS/MSD	
HR-136Q-DEP01	HR-136Q-DEP01-DEP-QJ0018-REG	Depositional soil	0-1	HR-136Q-DEP01-DEP-QJ0019-FD		TCL VOCs, TCL SVOCs, TAL Metals, Explosives, CI and Op Pesticides, and CI Herbicides
HR-136Q-DEP02	HR-136Q-DEP02-DEP-QJ0020-REG	Depositional soil	0-1		HR-136Q-DEP02-DEP-QJ0020-MS/MSD	TCL VOCs, TCL SVOCs, TAL Metals, Explosives, CI and Op Pesticides, and CI Herbicides

CI and Op - Chlorinated and Organophosphorous.  
 Explosives - Nitroaromatic and Nitramine.  
 FD - Field duplicate.  
 MS/MSD - Matrix spike/matrix spike duplicate.  
 QA/QC - Quality assurance/quality control.  
 REG - Field sample.

SVOCs - Semivolatile organic compounds.  
 TAL - Target analyte list.  
 TCL - Target compound list.  
 TOC - Total organic carbon  
 VOCs - Volatile organic compounds.

#### **4.5 Analytical Program**

Samples collected at locations specified in this chapter of this SFSP will be analyzed for the specific suites of chemicals and elements based on the history of site usage, as well as EPA, ADEM, FTMC, and USACE requirements. Target analyses for samples collected from the Impact Area, Parcel 136Q-X, consist of the following list of analytical suites:

- Target Analyte List Metals - Method 6010B/7000.
- Nitroaromatic/Nitramine explosives - Method 8330.

Ten percent of the sample types will be analyzed for an extended suite of parameters which includes:

- Target compound list volatile organic compounds - Method 5035/8260B
- Target compound list semivolatile organic compounds - Method 8270C
- Chlorinated herbicides - Method 8151A
- Chlorinated pesticides - Method 8081A
- Organophosphorus pesticides - Method 8141A.

The samples will be analyzed using EPA SW-846 methods, including Update III Methods where applicable, as presented in Table 4-4 in this SFSP and Section 5.0 in the QAP (IT, 2002a). Data will be reported in accordance with definitive data requirements of Chapter 2 of the USACE Engineering Manual 200-1-6, *Chemical Quality Assurance For Hazardous, Toxic And Radioactive Waste (HTRW) Projects* (USACE, 1997), and evaluated by the stipulated requirements for the generation of definitive data (Section 7.2.2 of the QAP). Chemical data will be reported via hard-copy data packages by the laboratory, using Contract Laboratory Program-like forms along with electronic copies. These packages will be validated in accordance with EPA National Functional Guidelines by Level III criteria.

#### **4.6 Sample Preservation, Packaging, and Shipping**

Sample preservation, packaging, and shipping will follow the procedures specified in Sections 6.1.3 through 6.1.7 of the SAP (IT, 2002a). Completed analysis request/COC records will be secured and included with each shipment of coolers to:

Table 4-4

**Analytical Samples  
Site Investigation  
Impact Area, Parcel 136Q-X  
Fort McClellan, Alabama**

Parameters	Analysis Method	Sample Matrix	TAT Needed	Field Samples			QA/QC Samples <sup>a</sup>				EMAX
				No. of Sample Points	No. of Events	No. of Field Samples	Field Dups (10%)	MS/MSD (5%)	Trip Blank (1/ship)	Eq. Rinse (1/wk/matrix)	Total No. Analysis
Parcel 136Q-X: 18 soil matrix samples (8 surface, 8 subsurface soil samples, and 2 depositional soil samples)											
All samples will be analyzed for the following parameters:											
Explosives	8330	soil	normal	18	1	18	2	1	0	1	23
TAL Metals	6010B/7000	soil	normal	18	1	18	2	1	0	1	23
Approximately 10% of the sample types will be analyzed for the following parameters:											
TCL VOCs	8260B	soil	normal	6	1	6	1	1	0	1	10
TCL SVOCs	8270C	soil	normal	6	1	6	1	1	0	1	10
Chlorinated Pesticides	8081A	soil	normal	6	1	6	1	1	0	1	10
Organophosphorus Pesticides	8141A	soil	normal	6	1	6	1	1	0	1	10
Chlorinated Herbicides	8151A	soil	normal	6	1	6	1	1	0	1	10
Parcel 136Q-X Subtotal:				66	9	7	0	7	0	7	96

<sup>a</sup>Field duplicate, and MS/MSD samples are calculated as a percentage of the field samples collected per site and were rounded to the nearest whole number.

Trip blank samples will be collected with water matrix samples for VOC analysis only. Assumed four field samples per day to estimate trip blanks. Equipment blanks will be collected once per event whenever sampling equipment is field decontaminated and re-used. They will be repeated weekly for sampling events that last more than 1 week.

MS/MSD - Matrix spike/matrix spike duplicate.  
Explosives - Nitroaromatic and Nitramine.  
QA/QC - Quality assurance/quality control.  
SVOCs - Semivolatile organic compounds.

TAL - Target analyte list.  
TAT - Turn-around time  
TCL - Target compound list.  
VOCs - Volatile organic compounds.

Ship samples to: EMAX Laboratories, Inc.  
1835 205th Street  
Torrance, CA 90501  
Attn: Elizabeth McIntyre  
Tel: 310-618-8889  
Fax: 310-618-0818



Attn: Elizabeth McIntyre  
EMAX Laboratories, Inc.  
1835 205th Street  
Torrance, California 90501  
Telephone: (310) 618-8889.

#### ***4.7 Investigation-Derived Waste Management***

Management and disposal of the investigation-derived wastes (IDW) will follow procedures and requirements as described in Appendix D of the SAP (IT, 2002a). The IDW generated at Impact Area, Parcel 136Q-X, is expected to include decontamination fluids, drill cuttings, and disposable personal protective equipment. Sampling of IDW to obtain analytical results for waste characterization for disposal will follow the procedures specified in Section 6.1.1.8 of the SAP (IT, 2002a).

#### ***4.8 Site-Specific Safety and Health***

Health and safety requirements for this SI are provided in the SSHP attachment for Impact Area, Parcel 136Q-X. The SSHP attachment will be used in conjunction with the SHP, Appendix A of the SAP (IT, 2002a).

## ***5.0 Project Schedule***

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The project schedule for the SI activities will be provided by the IT Project Manager to the Base Realignment and Closure Team.

## 6.0 References

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Environmental Science and Engineering, Inc. (ESE), 1998, ***Final Environmental Baseline Survey, Fort McClellan, Alabama***, prepared for U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland, January.

Fort McClellan (FTMC), 1997, ***Fort McClellan Comprehensive Reuse Plan***, Fort McClellan Reuse and Redevelopment Authority of Alabama, prepared under contract to the Calhoun County Commission, November.

IT Corporation (IT), 2002a, ***Draft Revision 3, Installation-Wide Sampling and Analysis Plan, Fort McClellan, Calhoun County, Alabama***, February.

IT Corporation (IT), 2002b, ***Draft Revision 2, Installation-Wide Work Plan, Fort McClellan, Calhoun County, Alabama***, February.

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U.S. Army Corps of Engineers (USACE), 1999b, ***Statement of Work for Task Order CK10, Remedial Investigations (RIs) at the Chemical Warfare Material Sites, RIs at the Fuel/Training Areas, RIs at the Print Plants/Motor Pools, RIs at the Ground Scars/Boiler Plants, RI at Range 24A, Site Investigations (SIs) at the Historic Ranges, and a Groundwater Investigation at Rideout Field at Fort McClellan, Alabama***, June.

U.S. Army Corps of Engineers (USACE), 1997, ***Engineer Manual 200-1-6, Chemical Quality Assurance For Hazardous, Toxic and Radioactive Waste (HTRW) Projects***.

U.S. Department of Agriculture (USDA), 1961, ***Soil Survey, Calhoun County, Alabama***, Soil Conservation Service, Series 1958, No. 9, September 1961.

U.S. Environmental Protection Agency (EPA), 2000, ***Guidance for the Data Quality Objectives Process***, EPA 600/R-96/005, August.

U.S. Environmental Protection Agency (EPA), 1990, ***Installation Assessment, Army Closure Program, Fort McClellan, Anniston, Alabama (TS-PIC-89334), Environmental Photographic Interpretation Center (EPIC)***, Environmental Monitoring Systems Laboratory.

**ATTACHMENT 1**

**LIST OF ABBREVIATIONS AND ACRONYMS**

# List of Abbreviations and Acronyms

2,4-D	2,4-dichlorophenoxyacetic acid	BCT	BRAC Cleanup Team	Cl.	chlorinated
2,4,5-T	2,4,5-trichlorophenoxyacetic acid	BERA	baseline ecological risk assessment	CLP	Contract Laboratory Program
2,4,5-TP	silvex	BEHP	bis(2-ethylhexyl)phthalate	cm	centimeter
3D	3D International Environmental Group	BFB	bromofluorobenzene	CN	chloroacetophenone
AB	ambient blank	BFE	base flood elevation	CNB	chloroacetophenone, benzene, and carbon tetrachloride
AbB3	Anniston gravelly clay loam, 2 to 6 percent slopes, severely eroded	BG	Bacillus globigii	CNS	chloroacetophenone, chloropicrin, and chloroform
AbC3	Anniston gravelly clay loam, 6 to 10 percent slopes, severely eroded	bgs	below ground surface	CO	carbon monoxide
AbD3	Anniston and Allen gravelly clay loams, 10 to 15 percent slopes, eroded	BHC	betahexachlorocyclohexane	Co-60	cobalt-60
Abs	skin absorption	BHHRA	baseline human health risk assessment	CoA	Code of Alabama
ABS	dermal absorption factor	BIRTC	Branch Immaterial Replacement Training Center	COC	chain of custody; contaminant of concern
AC	hydrogen cyanide	bkg	background	COE	Corps of Engineers
ACAD	AutoCadd	bls	below land surface	Con	skin or eye contact
AcB2	Anniston and Allen gravelly loams, 2 to 6 percent slopes, eroded	BOD	biological oxygen demand	COPC	chemical(s) of potential concern
AcC2	Anniston and Allen gravelly loams, 6 to 10 percent slopes, eroded	Bp	soil-to-plant biotransfer factors	COPEC	chemical(s) of potential ecological concern
AcD2	Anniston and Allen gravelly loams, 10 to 15 percent slopes, eroded	BRAC	Base Realignment and Closure	CPSS	chemicals present in site samples
AcE2	Anniston and Allen gravelly loams, 15 to 25 percent slopes, eroded	Braun	Braun Intertec Corporation	CQCSM	Contract Quality Control System Manager
ACGIH	American Conference of Governmental Industrial Hygienists	BSAF	biota-to-sediment accumulation factors	CRDL	contract-required detection limit
AdE	Anniston and Allen stony loam, 10 to 25 percent slope	BSC	background screening criterion	CRL	certified reporting limit
ADEM	Alabama Department of Environmental Management	BTAG	Biological Technical Assistance Group	CRQL	contract-required quantitation limit
ADPH	Alabama Department of Public Health	BTEX	benzene, toluene, ethyl benzene, and xylenes	CRZ	contamination reduction zone
AEC	U.S. Army Environmental Center	BTOC	below top of casing	Cs-137	cesium-137
AEL	airborne exposure limit	BTV	background threshold value	CS	ortho-chlorobenzylidene-malononitrile
AET	adverse effect threshold	BW	biological warfare; body weight	CSEM	conceptual site exposure model
AF	soil-to-skin adherence factor	BZ	breathing zone; 3-quinuclidinyl benzilate	CSM	conceptual site model
AHA	ammunition holding area	C	ceiling limit value	CT	central tendency
AL	Alabama	Ca	carcinogen	ctr.	container
ALAD	-aminolevulinic acid dehydratase	CAB	chemical warfare agent breakdown products	CWA	chemical warfare agent
amb.	Amber	CAMU	corrective action management unit	CWM	chemical warfare material; clear, wide mouth
amsl	above mean sea level	CBR	chemical, biological and radiological	CX	dichloroformoxime
ANAD	Anniston Army Depot	CCAL	continuing calibration	‘D’	duplicate; dilution
AOC	area of concern	CCB	continuing calibration blank	D&I	detection and identification
APEC	areas of potential ecological concern	CCV	continuing calibration verification	DAF	dilution-attenuation factor
APT	armor-piercing tracer	CD	compact disc	DANC	decontamination agent, non-corrosive
AR	analysis request	CDTF	Chemical Defense Training Facility	°C	degrees Celsius
ARAR	applicable or relevant and appropriate requirement	CEHNC	U.S. Army Engineering and Support Center, Huntsville	°F	degrees Fahrenheit
AREE	area requiring environmental evaluation	CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	DCE	dichloroethene
ASP	Ammunition Supply Point	CERFA	Community Environmental Response Facilitation Act	DDD	dichlorodiphenyldichloroethane
ASR	Archives Search Report	CESAS	Corps of Engineers South Atlantic Savannah	DDE	dichlorodiphenyldichloroethene
AST	aboveground storage tank	CF	conversion factor	DDT	dichlorodiphenyltrichloroethane
ASTM	American Society for Testing and Materials	CFC	chlorofluorocarbon	DEH	Directorate of Engineering and Housing
AT	averaging time	CFDP	Center for Domestic Preparedness	DEP	depositional soil
ATSDR	Agency for Toxic Substances and Disease Registry	CFR	Code of Federal Regulations	DFTPP	decafluorotriphenylphosphine
ATV	all-terrain vehicle	CG	carbonyl chloride (phosgene)	DI	deionized
AWARE	Associated Water and Air Resources Engineers, Inc.	CGI	combustible gas indicator	DID	data item description
AWWSB	Anniston Water Works and Sewer Board	ch	inorganic clays of high plasticity	DIMP	di-isopropylmethylphosphonate
‘B’	Analyte detected in laboratory or field blank at concentration greater than the reporting limit (and greater than zero)	CHPPM	U.S. Army Center for Health Promotion and Preventive Medicine	DM	dry matter
BCF	blank correction factor; bioconcentration factor	CK	cyanogen chloride	DMBA	dimethylbenz(a)anthracene
		cl	inorganic clays of low to medium plasticity	DMMP	dimethylmethylphosphonate

**List of Abbreviations and Acronyms** (Continued)

DOD	U.S. Department of Defense
DOJ	U.S. Department of Justice
DOT	U.S. Department of Transportation
DP	direct-push
DPDO	Defense Property Disposal Office
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
DS	deep (subsurface) soil
DS2	Decontamination Solution Number 2
DWEL	drinking water equivalent level
E&E	Ecology and Environment, Inc.
EB	equipment blank
EBS	environmental baseline survey
EC <sub>50</sub>	effects concentration for 50 percent of a population
ECBC	Edgewood Chemical/Biological Command
ED	exposure duration
EDD	electronic data deliverable
EF	exposure frequency
EDQL	ecological data quality level
EE/CA	engineering evaluation and cost analysis
Elev.	elevation
EM	electromagnetic
EMI	Environmental Management Inc.
EM31	Geonics Limited EM31 Terrain Conductivity Meter
EM61	Geonics Limited EM61 High-Resolution Metal Detector
EOD	explosive ordnance disposal
EODT	explosive ordnance disposal team
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPIC	Environmental Photographic Interpretation Center
EPRI	Electrical Power Research Institute
ER	equipment rinsate
ERA	ecological risk assessment
ER-L	effects range-low
ER-M	effects range-medium
ESE	Environmental Science and Engineering, Inc.
ESMP	Endangered Species Management Plan
ESN	Environmental Services Network, Inc.
ESV	ecological screening value
ET	exposure time
EU	exposure unit
Exp.	explosives
E-W	east to west
EZ	exclusion zone
FAR	Federal Acquisition Regulations
FB	field blank

FD	field duplicate
FDA	U.S. Food and Drug Administration
FedEx	Federal Express, Inc.
FEMA	Federal Emergency Management Agency
FFCA	Federal Facilities Compliance Act
FFE	field flame expedient
FFS	focused feasibility study
FI	fraction of exposure
Fil	filtered
FIt	filtered
FMDC	Fort McClellan Development Commission
FML	flexible membrane liner
FMP 1300	Former Motor Pool 1300
FOMRA	Former Ordnance Motor Repair Area
Foster Wheeler	Foster Wheeler Environmental Corporation
Frtn	fraction
FS	field split; feasibility study
FSP	field sampling plan
ft	feet
ft/ft	feet per foot
FTA	Fire Training Area
FTMC	Fort McClellan
FTRRRA	FTMC Reuse & Redevelopment Authority
g	gram
g/m <sup>3</sup>	gram per cubic meter
G-856	Geometrics, Inc. G-856 magnetometer
G-858G	Geometrics, Inc. G-858G magnetic gradiometer
GAF	gastrointestinal absorption factor
gal	gallon
gal/min	gallons per minute
GB	sarin
gc	clay gravels; gravel-sand-clay mixtures
GC	gas chromatograph
GCL	geosynthetic clay liner
GC/MS	gas chromatograph/mass spectrometer
GCR	geosynthetic clay liner
GFAA	graphite furnace atomic absorption
GIS	Geographic Information System
gm	silty gravels; gravel-sand-silt mixtures
gp	poorly graded gravels; gravel-sand mixtures
gpm	gallons per minute
GPR	ground-penetrating radar
GPS	global positioning system
GS	ground scar
GSA	General Services Administration; Geologic Survey of Alabama
GSBP	Ground Scar Boiler Plant
GSSI	Geophysical Survey Systems, Inc.
GST	ground stain

GW	groundwater
gw	well-graded gravels; gravel-sand mixtures
HA	hand auger
HCl	hydrochloric acid
HD	distilled mustard
HDPE	high-density polyethylene
HEAST	Health Effects Assessment Summary Tables
Herb.	herbicides
HHRA	human health risk assessment
HI	hazard index
HPLC	high performance liquid chromatography
HNO <sub>3</sub>	nitric acid
HQ	hazard quotient
HQ <sub>screen</sub>	screening-level hazard quotient
hr	hour
H&S	health and safety
HSA	hollow-stem auger
HTRW	hazardous, toxic, and radioactive waste
‘I’	out of control, data rejected due to low recovery
IATA	International Air Transport Authority
ICAL	initial calibration
ICB	initial calibration blank
ICP	inductively-coupled plasma
ICRP	International Commission on Radiological Protection
ICS	interference check sample
ID	inside diameter
IDL	instrument detection limit
IDLH	immediately dangerous to life or health
IDM	investigative-derived media
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
IF	ingestion factor; inhalation factor
ILCR	incremental lifetime cancer risk
IMPA	isopropylmethyl phosphonic acid
IMR	Iron Mountain Road
in.	inch
Ing	ingestion
Inh	inhalation
IP	ionization potential
IPS	International Pipe Standard
IR	ingestion rate
IRDMIS	Installation Restoration Data Management Information System
IRIS	Integrated Risk Information Service
IRP	Installation Restoration Program
IS	internal standard
ISCP	Installation Spill Contingency Plan
IT	IT Corporation
ITEMS	IT Environmental Management System™

**List of Abbreviations and Acronyms** (Continued)

‘J’	estimated concentration	MMBtu/hr	million Btu per hour	NRCC	National Research Council of Canada
JeB2	Jefferson gravelly fine sandy loam, 2 to 6 percent slopes, eroded	MOGAS	motor vehicle gasoline	NRHP	National Register of Historic Places
JeC2	Jefferson gravelly fine sandy loam, 6 to 10 percent slopes, eroded	MP	Military Police	ns	nanosecond
JfB	Jefferson stony fine sandy loam, 0 to 10 percent slopes have strong slopes	MPA	methyl phosphonic acid	N-S	north to south
JPA	Joint Powers Authority	MPM	most probable munition	NS	not surveyed
K	conductivity	MQL	method quantitation limit	NSA	New South Associates, Inc.
K <sub>ow</sub>	octonal-water partition coefficient	MR	molasses residue	nT	nanotesla
L	lewisite; liter	MRL	method reporting limit	nT/m	nanoteslas per meter
l	liter	MS	matrix spike	NTU	nephelometric turbidity unit
LBP	lead-based paint	mS/cm	millisiemens per centimeter	nv	not validated
LC	liquid chromatography	mS/m	millisiemens per meter	O <sub>2</sub>	oxygen
LCS	laboratory control sample	MSD	matrix spike duplicate	O&G	oil and grease
LC <sub>50</sub>	lethal concentration for 50 percent population tested	MTBE	methyl tertiary butyl ether	O&M	operation and maintenance
LD <sub>50</sub>	lethal dose for 50 percent population tested	msl	mean sea level	OB/OD	open burning/open detonation
LEL	lower explosive limit	MtD3	Montevallo shaly, silty clay loam, 10 to 40 percent slopes , severely eroded	OD	outside diameter
LOAEL	lowest-observed-advserse-effects-level	mV	millivolts	OE	ordnance and explosives
LT	less than the certified reporting limit	MW	monitoring well	oh	organic clays of medium to high plasticity
LUC	land-use control	MWI&P	Monitoring Well Installation and Management Plan	ol	organic silts and organic silty clays of low plasticity
LUCAP	land-use control assurance plan	Na	sodium	OP	organophosphorus
LUCIP	land-use control implementation plan	NA	not applicable; not available	ORP	oxidation-reduction potential
max	maximum	NAD	North American Datum	OSHA	Occupational Safety and Health Administration
MB	method blank	NAD83	North American Datum of 1983	OSWER	Office of Solid Waste and Emergency Response
MCL	maximum contaminant level	NAVD88	North American Vertical Datum of 1988	OVM-PID/FID	organic vapor meter-photoionization detector/flame ionization detector
MCLG	maximum contaminant level goal	NAS	National Academy of Sciences	OWS	oil/water separator
MCPA	4-chloro-2-methylphenoxyacetic acid	NCEA	National Center for Environmental Assessment	oz	ounce
MCS	media cleanup standard	NCP	National Contingency Plan	PA	preliminary assessment
MD	matrix duplicate	NCRP	National Council on Radiation Protection and Measurements	PAH	polynuclear aromatic hydrocarbon
MDC	maximum detected concentration	ND	not detected	PARCCS	precision, accuracy, representativeness, comparability, completeness, and sensitivity
MDCC	maximum detected constituent concentration	NE	no evidence; northeast	Parsons	Parsons Engineering Science, Inc.
MDL	method detection limit	ne	not evaluated	Pb	lead
mg	milligrams	NEW	net explosive weight	PBMS	performance-based measurement system
mg/kg	milligrams per kilogram	NFA	No Further Action	PC	permeability coefficient
mg/kg/day	milligram per kilogram per day	NG	National Guard	PCB	polychlorinated biphenyl
mg/kgbw/day	milligrams per kilogram of body weight per day	NGP	National Guardsperson	PCDD	polychlorinated dibenzo-p-dioxins
mg/L	milligrams per liter	ng/L	nanograms per liter	PCDF	polychlorinated dibenzofurans
mg/m <sup>3</sup>	milligrams per cubic meter	NGVD	National Geodetic Vertical Datum	PCE	perchloroethene
mh	inorganic silts, micaceous or diatomaceous fine, sandy or silt soils	Ni	nickel	PCP	pentachlorophenol
MHz	megahertz	NIC	notice of intended change	PDS	Personnel Decontamination Station
µg/g	micrograms per gram	NIOSH	National Institute for Occupational Safety and Health	PEF	particulate emission factor
µg/kg	micrograms per kilogram	NIST	National Institute of Standards and Technology	PEL	permissible exposure limit
µg/L	micrograms per liter	NLM	National Library of Medicine	PES	potential explosive site
µmhos/cm	micromhos per centimeter	NPDES	National Pollutant Discharge Elimination System	Pest.	pesticides
min	minimum	NPW	net present worth	PETN	pentarey thritol tetranitrate
MINICAMS	miniature continuous air monitoring system	No.	number	PFT	portable flamethrower
ml	inorganic silts and very fine sands	NOAA	National Oceanic and Atmospheric Administration	PG	professional geologist
mL	milliliter	NOAEL	no-observed-adverse-effects-level	PID	photoionization detector
mm	millimeter	NR	not requested; not recorded; no risk	PkA	Philo and Stendal soils local alluvium, 0 to 2 percent slopes
MM	mounded material	NRC	National Research Council		

**List of Abbreviations and Acronyms** (Continued)

PM	project manager	RTK	real-time kinematic	STL	Severn-Trent Laboratories
POC	point of contact	SA	exposed skin surface area	STOLS	Surface Towed Ordnance Locator System®
POL	petroleum, oils, and lubricants	SAD	South Atlantic Division	Std. units	standard units
POW	prisoner of war	SAE	Society of Automotive Engineers	SU	standard unit
PP	peristaltic pump; Proposed Plan	SAIC	Science Applications International Corporation	SUXOS	senior UXO supervisor
ppb	parts per billion	SAP	installation-wide sampling and analysis plan	SVOC	semivolatile organic compound
PPE	personal protective equipment	sc	clayey sands; sand-clay mixtures	SW	surface water
ppm	parts per million	Sch.	Schedule	SW-846	U.S. EPA’s <i>Test Methods for Evaluating Solid Waste: Physical/Chemical Methods</i>
PPMP	Print Plant Motor Pool	SCM	site conceptual model	SWMU	solid waste management unit
ppt	parts per thousand	SD	sediment	SWPP	storm water pollution prevention plan
PR	potential risk	SDG	sample delivery group	SZ	support zone
PRG	preliminary remediation goal	SDZ	safe distance zone; surface danger zone	TAL	target analyte list
PSSC	potential site-specific chemical	SEMS	Southern Environmental Management & Specialties, Inc.	TAT	turn around time
pt	peat or other highly organic silts	SF	cancer slope factor	TB	trip blank
PVC	polyvinyl chloride	SFSP	site-specific field sampling plan	TBC	to be considered
QA	quality assurance	SGF	standard grade fuels	TCA	trichloroethane
QA/QC	quality assurance/quality control	SHP	installation-wide safety and health plan	TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
QAM	quality assurance manual	SI	site investigation	TCDF	tetrachlorodibenzofurans
QAO	quality assurance officer	SINA	Special Interest Natural Area	TCE	trichloroethene
QAP	installation-wide quality assurance plan	SL	standing liquid	TCL	target compound list
QC	quality control	SLERA	screening-level ecological risk assessment	TCLP	toxicity characteristic leaching procedure
QST	QST Environmental, Inc.	sm	silty sands; sand-silt mixtures	TDEC	Tennessee Department of Environment and Conservation
qty	quantity	SM	Serratia marcescens	TDGCL	thiodiglycol
Qual	qualifier	SMDP	Scientific Management Decision Point	TDGCLA	thiodiglycol chloroacetic acid
‘R’	rejected data; resample	s/n	signal-to-noise ratio	TERC	Total Environmental Restoration Contract
R&A	relevant and appropriate	SOP	standard operating procedure	THI	target hazard index
RA	remedial action	SOPQAM	U.S. EPA’s <i>Standard Operating Procedure/Quality Assurance Manual</i>	TIC	tentatively identified compound
RAO	removal action objective	sp	poorly graded sands; gravelly sands	TLV	threshold limit value
RBC	risk-based concentration	SP	submersible pump	TN	Tennessee
RCRA	Resource Conservation and Recovery Act	SPCC	system performance calibration compound	TNT	trinitrotoluene
RD	remedial design	SPCS	State Plane Coordinate System	TOC	top of casing; total organic carbon
RDX	cyclonite	SPM	sample planning module	TPH	total petroleum hydrocarbons
ReB3	Rarden silty clay loams	SQRT	screening quick reference tables	TR	target cancer risk
REG	regular field sample	Sr-90	strontium-90	TRADOC	U.S. Army Training and Doctrine Command
REL	recommended exposure limit	SRA	streamlined human health risk assessment	TRPH	total recoverable petroleum hydrocarbons
RFA	request for analysis	SRM	standard reference material	TSCA	Toxic Substances Control Act
RfC	reference concentration	Ss	stony rough land, sandstone series	TSDF	treatment, storage, and disposal facility
RfD	reference dose	SS	surface soil	TWA	time-weighted average
RGO	remedial goal option	SSC	site-specific chemical	UCL	upper confidence limit
RI	remedial investigation	SSHO	site safety and health officer	UCR	upper certified range
RL	reporting limit	SSHP	site-specific safety and health plan	‘U’	not detected above reporting limit
RME	reasonable maximum exposure	SSL	soil screening level	UF	uncertainty factor
ROD	Record of Decision	SSSL	site-specific screening level	USACE	U.S. Army Corps of Engineers
RPD	relative percent difference	SSSSL	site-specific soil screening level	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
RRF	relative response factor	STB	supertropical bleach	USAEC	U.S. Army Environmental Center
RSD	relative standard deviation	STC	source-term concentration	USAEHA	U.S. Army Environmental Hygiene Agency
RTC	Recruiting Training Center	STD	standard deviation	USACMLS	U.S. Army Chemical School
RTECS	Registry of Toxic Effects of Chemical Substances	STEL	short-term exposure limit	USAMPS	U.S. Army Military Police School



**List of Abbreviations and Acronyms** (Continued)

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USATCES	U.S. Army Technical Center for Explosive Safety
USATEU	U.S. Army Technical Escort Unit
USATHAMA	U.S. Army Toxic and Hazardous Material Agency
USC	United States Code
USCS	Unified Soil Classification System
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance level; upper tolerance limit
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Supervisor
UXOSO	UXO safety officer
V	vanadium
VOA	volatile organic analyte
VOC	volatile organic compound
VOH	volatile organic hydrocarbon
VQlfr	validation qualifier
VQual	validation qualifier
VX	nerve agent (O-ethyl-S-[diisopropylaminoethyl]-methylphosphonothiolate)
WAC	Women’s Army Corps
Weston	Roy F. Weston, Inc.
WP	installation-wide work plan
WRS	Wilcoxon rank sum
WS	watershed
WSA	Watershed Screening Assessment
WWI	World War I
WWII	World War II
XRF	x-ray fluorescence
yd <sup>3</sup>	cubic yards

T – Non-target compound analyzed for but not detected (non GC/MS methods)  
U – Analysis in unconfirmed  
Z – Non-target compound analyzed for and detected (non-GC/MS methods)

Qualifiers  
J – The low-spike recovery is low  
N – The high-spike recovery is low  
R – Data is rejected

SAIC – Data Qualifiers, Codes and Footnotes, 1995 Remedial Investigation

N/A – Not analyzed

ND – Not detected

Boolean Codes

LT – Less than the certified reporting limit

Flagging Codes

- 9 – Non-demonstrated/validated method performed for USAEC
- B – Analyte found in the method blank or QC blank
- C – Analysis was confirmed
- D – Duplicate analysis
- I – Interfaces in sample make quantitation and/or identification to be suspicious
- J – Value is estimated
- K – Reported results are affected by interfaces or high background
- N – Tentatively identified compound (match greater than 70%)
- Q – Sample interference obscured peak of interest
- R – Non-target compound analyzed for but not detected (GC/MS methods)
- S – Non-target compound analyzed for and detected (GC/MS methods)